shows R111. Therefore, no amendment of the drawings is required. Accordingly, Applicant respectfully requests that the objection be withdrawn.

Claims 1-30 are objected to on page 3 of the Official Action for being in improper format and are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claims 1-30 have been cancelled and replaced by new claims 31-53 in order to place the claims in proper U.S. format and to correct the various errors pointed out in the Official Action. No new matter has been added. Accordingly, Applicant respectfully submits that the rejection has been overcome and requests that the rejection be withdrawn.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

Date: September 17, 1998

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APPENDIX OF CLAIMS

Sub B17

31. A capacitor regulated controllable voltage and current power supply comprising:

a voltage reducing and current limiting rectifying circuit arranged to be connected to an AC power source having one or more phases and AC output terminals, wherein

said rectifying circuit includes a current rectifier device having rectifier output terminals, said current rectifier device being parallel connected to said AC output terminals; and

a capacitor parallel connected to a resistor and series connected between said AC power source and said current rectifier device.

A1 Cont

2 1

~~32~~. The power supply of claim ~~31~~, wherein

said capacitor is series connected between said AC power source and primary windings of a transformer, whereby secondary windings of said transformer are connected to said current rectifier device.

3 1

~~33~~. The power supply of claim ~~31~~, wherein

said AC power source is connected to primary windings of a transformer and said capacitor is series connected between secondary windings of said transformer and said current rectifier device.

4 1

~~34~~. The power supply of claim ~~31~~, wherein

said capacitor is series connected between said AC source and primary windings of a transformer, whereby secondary windings of said transformer are respectively connected to diodes to form a full wave current rectifier circuit.

5 1

~~35~~. The power supply of claim ~~31~~, wherein

said capacitor is three capacitors respectively series connected between three AC output terminals of a three phase AC power source and three input terminals of a three phase full wave current rectifier device.

6 1

~~36.~~ The power supply of claim ~~31~~, wherein

said AC power source is connected to a three phase transformer; and

said capacitor is three capacitors respectively series connected between three terminals of a secondary winding of said transformer and a three input terminals of a three phase full wave current rectifier device.

37. The power supply of claim 31 further comprising:

a controllable current distributing device for actively controlling output voltage, said controllable current distributing device being parallel connected to said current rectifier device output terminals; and

a voltage output control device connected to said controllable current distributing device for supplying a control bias voltage to said distributing device.

7 ~~31~~ 1

~~38.~~ The power supply of claim ~~37~~, wherein

said current rectifier device is a bridge-type full wave current rectifier device having positive and negative terminals and AC terminals;

said positive and negative terminals are parallel connected in a current direction to said controllable current distributing device and said voltage output control device, and said AC terminals are parallel connected to said AC output terminals.

8 7

~~39.~~ The power supply of claim ~~38~~, wherein

said AC output terminals are series connected to a load current detector device and parallel connected to a load voltage detector device to control said output voltage control device.

1

9 ~~31~~

~~40.~~ The power supply of claim ~~37~~, further comprising:

a second capacitor connected in parallel with said rectifier output terminals between said rectifier output terminals and said controllable current distributing device.

41. The power supply of claim 37, wherein

an output voltage control device with a bias arranged to be selectively connected to a control terminal of said controllable current distributing device, said bias including a series connected zener diode and current limiting resistor;

a diode arranged to be selectively series connected in a current direction between said controllable current distributing device and said output voltage control device; and

a capacitor arranged to be selectively parallel connected with said load at a point between said output voltage control device said load.

10 37 1
42. The power supply of claim 41, wherein

said current limiting resistor is parallel connected to said AC terminals and is a variable resistor having a tap terminal for producing a control voltage bias.

11 18
43. The power supply of claim 42, wherein said controllable current distributing device includes a thyristor, said thyristor having a control connected to said tap terminal.

12 37 1
44. The power supply of claim 41, wherein said current limiting resistor is a voltage distributing resistor, whereby said voltage distributing resistor has a tap terminal between two series connected resistors parallel connected between the two power source terminals, said tap terminal providing a proportional voltage bias.

13 37 1
45. The power supply of claim 41, wherein a pulse-width modulation voltage output control device is connected to said output voltage control device.

14 18
46. The power supply of claim 42, wherein

said variable resistor is series connected to a phase shifting capacitor and said variable resistor tap produces a phase angle triggering modulation output voltage series connected to a triggering diode that controls said current distributing device.

47. The power supply of claim 41, wherein said

said voltage output control device is a phase angle triggering modulation output voltage control device including a current limiting resistor, wherein

said current limiting resistor is parallel connected to said AC terminals and is a variable resistor having a tap terminal for producing a thyristor control voltage bias, and

said controllable current distributing device includes a thyristor, said thyristor having a control connected to said tap terminal.

48. The power supply of claim 47, further including a diode arranged to be selectively series connected in a current direction between said controllable current distributing device and said output voltage control device.

49. The power supply of claim 48, further including a capacitor parallel connected with said load at a point between said output voltage control device said load.

50. The power supply of claim 37, further comprises a multiple voltage output circuit including:

one or more controllable current distribution devices series connected in a polarity direction and together parallel connected with said AC output terminals, wherein each said controllable current distribution device is controlled by a respective voltage output control device, and said series connection forms an output voltage terminal;

a diode arranged to be selectively series connected to said rectifier output terminal in a current direction between one of said one or more controllable current distributing devices and said respective output voltage control device; and

one or more capacitors each arranged to be selectively parallel connected between said output voltage terminal and a load terminal.

51. The power supply of claim 37, wherein said one or more controllable current distribution devices is a thyristor.

52. The power supply of claim 37, wherein

said current rectifier device is one or more bridge-type full wave current rectifier devices each having positive and negative terminals and two AC terminals;

said positive and negative terminals of each said current rectifier device are parallel connected in a current direction to a respective controllable current distributing device and voltage output control device;

said two AC terminals of each said current rectifier are respectively series connected to load current detector devices and respectively parallel connected to load voltage detector devices to respectively control output voltage control devices, wherein

said series connection between current rectifier devices forms an AC voltage output terminal.

53. The power supply of claim 37 further comprising:

a series connected resistor and zener diode parallel connected with load terminals, wherein a tap connected to said series connection is connected to an output voltage control device, thereby conducting a feedback signal to said output voltage control device which controls said current distributing device.

PHOTOCOPY OF THE ORIGINAL HAND-CORRECTED SPECIFICATION

#8 Markup Copy

Global replace of "capacitor regulating" to "--capacitor regulated--

THE ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT

SUMMARY OF THE INVENTION

Background #1

It is thus an objective of the invention to provide an improved

~~The active~~ capacitor regulating type controllable voltage and current power supply circuit is disclosed with a voltage reducing and current limiting rectifying circuit ~~which is constituted~~ formed by capacitors and a bridge type current rectifier device, ~~wherein it is characterized in that~~ the output terminals of the rectifying circuit are parallel ~~installed with~~ connected to a current distributing circuit device, ~~thereby to actively~~ which controls the output voltage ~~setting status~~.

Insert p 4, Ln 18-22, & page 5 Ln 1-14

BRIEF DESCRIPTION OF THE DRAWINGS

Insert blanks

Figure 1 is ~~the basic circuit block~~ a schematic circuit diagram of the invention.

Figure 2 is a circuit schematic diagram of the invention illustrating ~~that the active~~ a capacitor that is ~~directly~~ series combined with the AC input terminal of the full wave current rectifier device.

Figure 3 is a circuit schematic diagram of the invention illustrating ~~that the active~~ a capacitor is series ~~combined~~ connected ~~with~~ to the primary winding of ~~the~~ a transformer ~~whereby~~ and through the secondary winding of the transformer to provide an output to the full wave current rectifier device.

Figure 4 is a circuit schematic diagram of the invention illustrating that the ~~active~~ capacitor is series ~~combined~~ connected between the secondary winding of the transformer and the current rectifier device.

Figure 5 is a circuit schematic diagram of the invention illustrating ~~that the active~~ a capacitor ~~is~~ series ~~combined~~ connected

with the primary winding of the transformer, ~~whereby~~ and the secondary winding of the transformer with intermediate ~~extractions~~ taps and two diodes ~~constitute~~ form a full wave current rectifier circuit.

Figure 6 is a circuit schematic diagram of the invention illustrating ~~that~~ three ~~active~~ capacitors ~~are~~ each respectively series combined between the three phase AC power source and the three phase full wave current rectifier device.

Figure 7 is a circuit schematic diagram of the invention illustrating ~~that~~ three ~~active~~ capacitors ~~are~~ each respectively series combined between the secondary winding of the three phase transformer and the three phase full wave current rectifier device.

Figure 8 is a circuit schematic diagram of the invention illustrating ~~that~~ the ~~active~~ capacitor ~~is~~ series ~~installed~~ connected between the single phase power source and the load, while the AC terminals of the full current bridge type current rectifier are parallel ~~combined~~ connected with the two AC output terminals.

Figure 9 is a circuit schematic diagram of the invention ~~illustrating~~ start ~~that~~ the front section DC output terminals ~~are~~ directly parallel combined with a controllable current distributing device.

Figure 10 is a circuit schematic diagram of the invention illustrating ~~that~~ the DC output terminals ~~are~~ first parallel combined with ~~wave~~ a filter capacitor and then parallel combined with a controllable current distributing device.

Figure 11 is a circuit schematic diagram of the

invention illustrating ~~that~~ a controllable current distributing device ~~comprising of~~ including a linear or switching type solid state controllable current distributing components or electromechanical components ~~are~~ controlled by a voltage output control device with a fixed bias.

Figure 12 is a circuit schematic diagram of the invention illustrating ~~that~~ ~~the~~ a controllable current distributing device ~~comprising of~~ including thyristors ~~is~~ controlled by a voltage output control device with controllable voltage output.

Figure 13 is a circuit schematic diagram of the invention illustrating ~~that~~ ~~the~~ a proportional bias voltage circuit ~~constituted~~ formed by ~~the~~ voltage distributing resistors and ~~the~~ a zener diode which is series combined between the power source and control terminal of the controllable current distributing device.

Figure 14 is a circuit schematic diagram of the invention illustrating ~~that~~ ~~the~~ controllable current distributing device ~~is~~ controlled by a voltage output control device with adjustable and setting permissive bias.

Figure 15 is a circuit schematic diagram of the invention illustrating ~~that~~ ~~the~~ controllable current distributing device ~~is~~ controlled by the pulse-width modulation functioning voltage output control device for pulse-width modulation voltage output control.

Figure 16 is a circuit schematic diagram of the invention illustrating ~~that~~ ~~the~~ controllable current distributing device ~~comprised of~~ including thyristors ~~can be~~ controlled by a phase angle triggering modulation output

voltage control device.

Figure 17 is a circuit schematic diagram of the invention having output terminals series combined with an isolating diode in the current direction.

Figure 18 is a circuit schematic diagram of the invention illustrating that the output terminals are parallel combined with a wave filter capacitor.

Figure 19 is a circuit schematic diagram of the invention illustrating that the active capacitor is series connected between the single phase AC current power source and the load, and the two AC power output terminals leading to the load are parallel combined with a full wave current rectifier device and a controllable current distributing device.

Figure 20 is the first example of the invention illustrating a multiple voltage tap output circuit.

Figure 21 is the second example of the invention illustrating a multiple voltage tap output circuit.

Figure 22 is the third example of the invention illustrating a multiple voltage tap output circuit.

Figure 23 is a circuit schematic diagram of the invention illustrating a primary voltage stabilizing circuit installed ahead of the output terminals.

DETAILED DESCRIPTION OF THE INVENTION

Most conventional DC power supply circuit which reduces voltage using transformers, however, the power supply circuit of the present invention, in contrast, uses a capacitor as

the voltage reducing component and a bridge type current rectifier device for converting AC current to DC current, resulting in a power supply having a smaller volume, lesser weight, and lower cost, while if compared with high frequency carrier wave controlled switching type power supply circuit, it has a similar volume and weight, but less heat loss and even lower cost, as well as no noise interference (EMC), therefore it is gradually expanded from low power applications to medium and large power applications. Because the effect of using the active capacitor as a voltage reducing component is essentially the same as using the conventional series combined active resistors, i.e., the output terminal voltage is reverse related to the output current, i.e. when the output current is increased, the output terminal voltage is reduced while when the output current is decreased, the output terminal voltage will be raised. In addition, the active capacitor regulating type controllable voltage and current power supply circuit can be further installed with a controllable current distributing circuit device parallel combined with the output terminals of the current rectifier device whereby to actively control the output voltage, stabilized at the setting value.

The basic operating principles and application examples of the invention are described below:

Figure 1 is the basic circuit block diagram of the power supply circuit with controllable voltage and current through regulation of the active capacitor which is mainly comprised of the following:

(1) AC power source 100: it is a single phase or multiple phase power source coming from city power or from the

secondary AC power source of transformer.

An ~~active~~ The capacitor 101 ~~is constituted by all kinds~~ is any kind of capacitors ~~101~~ suitable for application ~~with~~ to AC power. ~~thereof~~ It can be directly series ~~combined~~ connected between the AC power source 100 and the current rectifier device 103, ~~or it can be series combined between~~ connected between the AC power source 100 and the primary terminals of transformer 102, or ~~can be series~~ ~~combined~~ connected between the secondary terminals of transformer 102 and current rectifier device 103.

~~wherein~~ The two end terminals of capacitor 101 can be further parallel ~~combined with relieving~~ connected to a by-pass resistor R101.

~~A transformer 102:~~ The transformer 102 is installed between the AC power source 100 and current rectifier device 103 for changing the voltage value of the AC power source 100. ~~wherein it~~ Transformer 102 is comprised of an isolated type structure with primary and secondary isolated windings or is a self-coupled transformer structure with self-coupled windings. ~~whereof~~ Its secondary output windings can be a three-terminal type secondary winding with intermediate ~~extractions~~ taps or the a two-terminal type secondary winding. ~~whereof~~ The transformer 102 is ~~a selective~~ an optional device which can be installed if required by the circuit. ~~and~~ The ~~active~~ capacitor 101 can be series ~~combined~~ connected between the primary terminals or secondary terminals of the transformer 102, or the transformer 102 can be omitted, ~~instead~~, while the AC power source 100 and the active capacitor 101 ~~is~~ are directly series ~~combined~~ connected before providing input to the current rectifier device 103.

~~A~~ The current rectifier device 103 ~~is~~ is a full wave bridge

type current rectifier device comprised of solid state rectifiers for converting input AC power into full wave DC output.

An optional first ~~wave~~ filter capacitor 104 ~~It~~ is parallel combined between the output positive and negative terminals of the current rectifier device 103 whereby to reduce voltage pulsation. ~~wherein the capacitor can be selected to be installed or not installed.~~

A controllable current distributing device 105 ~~It is~~ includes ~~constituted by a~~ linear, ~~or~~ switching type solid state, ~~or~~ electromechanical components, or thyristors, ~~wherein it~~ and is parallel ~~combined~~ connected between the output terminals of the current rectifier device 103 to maintain a stable output voltage by generating ~~generate~~ linear or switching type current ~~distributing functions~~ at load decrease or output voltage increase of the current rectifier 103 due to rising power source terminal voltage. ~~thereby to maintain a stable output voltage;~~

An output voltage control device 106 ~~It is comprised~~ includes of electromechanical or solid state components for controlling the operating status of the controllable current distributing device 105, ~~and further to~~ The device 106 controls the output terminal voltage of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit. ~~wherein the~~ The device 106 is comprised of : 1) ~~the~~ a current limiting resistor R110 and zener diode ZD110 ~~are~~ connected series ~~combined~~ and ~~are then~~ parallel connected ~~combined~~ between the power source and control terminal of the controllable current distributing device, thereby ~~to~~ forming ~~constitute~~ a voltage output control device with a fixed bias. 2) ~~the~~ fixed voltage distributing resistors R111,

R112 ~~are~~ parallel ~~combined~~ connected between the two terminals of power source, ~~while~~ and a zenor diode ZD110 ~~can be~~ optionally series ~~combined~~ connected between its ~~extraction~~ outer tap terminal and the controllable current distributing device, thereby ~~to~~ form ~~constitute~~ a voltage output control device with a proportional bias; 3) a variable resistor VR110 ~~can be~~ optionally parallel ~~combined~~ connected between the two terminals of power source, ~~while~~ and a zener diode ZD110 ~~can be~~ optionally series ~~combined~~ connected between the output terminal of the variable resistor and the controllable current distributing device, thereby ~~to~~ form ~~constitute~~ a voltage output control device with a controllable bias; 4) the voltage output control device comprising of the pulse-width modulation functioning output voltage control device CL110 ~~is~~ used to perform PWM control the controllable current distributing device; 5) ~~the~~ a voltage output control device ~~is~~ formed ~~constituted~~ by a phase angle triggering modulation circuit.

~~A~~ AN isolating diode 107 ~~it~~ is ~~for~~ series ~~combined~~ connected between the power source output terminal leading to the second ~~wave~~ filter capacitor 108 and further to the load 109, thereby ~~to~~ preventing the accumulated power at the second ~~wave~~ filter capacitor 108 from flowing back to the power source, ~~therein~~ the isolating diode 107 can be selected to be installed or not installed according to circuit requirements.

~~A~~ AN optional second ~~wave~~ filter capacitor 108 ~~it~~ is parallel ~~combined~~ connected between the circuit output terminals leading to the load for further reducing the voltage pulsation.

~~wherein the capacitor can be selected to be installed or not installed;~~

A load 109 ~~it~~ is either a resistive load, ~~or~~ a resistive and inductive mixing type load, ~~or~~ a rechargeable and accumulative type load, or a rotational electrical machine type load for matching with the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit.

The ~~active~~ capacitor regulating type controllable voltage and current power supply circuit can be installed with various type overload or short circuit protecting components such as a ~~safe~~ fuse, circuit breaker and various surge voltage absorbing protective components as well as various noise absorbing components;

An optional load terminal voltage detector device 110 ~~it~~ is coupled between the two terminals of load 109 for transferring the detected voltage feedback signal to the output voltage control device 106, ~~thereby to provide~~ thereby providing a voltage feedback control function on the controllable current distributing device. ~~whereof~~ the optional load terminal voltage detector device is comprised of electromechanical or solid state circuit components. ~~which can be selected to be installed or not installed;~~

An optional load current detector device 111 ~~it~~ is ~~combined~~ connected between the load 109 and the power source for transferring detected current signal to the voltage output control device 106, ~~thereby to provide~~ thereby providing a current feedback control function on controllable current distributing device 105. ~~whereof~~ the optional load current detector device 111 is comprised of electromechanical or solid state circuit components ~~which can be selected to be installed or not installed;~~.

TP An optional control interface 112 it is a manual or electromechanical signal control interface which includes ~~comprised of~~ electromechanical or solid state circuit components for controlling the voltage output control device 106 and controllable current distributing device 105. ~~wherein the optional control interface 112 can be selected to be~~ installed or not installed according to system requirements.

this line remains in spec.

TP Figure 1 a first embodiment of, shows the present invention as including a ~~is the basic~~ circuit structure to which different ~~of the subject design, wherein with the common basic features, according to the different omission and addition of~~ circuit components ~~as well as~~ and function selections can be added or omitted. The circuit can be divided into ~~the~~ a front section, which is a circuit that rectifies current ~~current rectifying circuit~~ from AC input to full wave rectified current output, and ~~the~~ a rear section output circuit which outputs ~~from~~ full wave DC power ~~source~~ to the load. ~~herein~~ the various ~~circuit embodying examples~~ embodiments of the front section current rectifying circuit and the rear section output circuit are respectively described ~~as~~ below.

Begin paragraph at ① then ② then ③

TP20 ② ~~Depending~~ If a transformer is selected, ~~on whether the transformer is selected, output types of the~~ the transformer secondary windings outputs to a ~~as well as their~~ matching full wave current rectifier device, and the series ~~combined~~ connected positions of ~~active~~ the capacitor, ① the specific front section current rectifying circuit ~~of the embodying example illustrated in~~ derived from figure 1 ~~has the following circuit embodying types:~~ embodiment

④ ~~It~~ the ~~active~~ capacitor 101 ~~is directly series combined~~ connected in series with the AC input terminals of the full wave current rectifier device 103. ~~such as that~~ figure 2 is a circuit schematic diagram of the ~~active~~ capacitor

(3) are also selected

④ Figure 2 is a schematic circuit diagram which shows ~~the~~ second

FP Figure (A) is a schematic circuit diagram which shows ~~that the~~ (B) preferred embodiment of the present invention that includes regulating type controllable voltage and current power supply circuit, illustrating that the ~~active~~ capacitor is directly series ~~combined with~~ connected to the AC input terminal of the full wave current rectifier device.

(A) 3 (B) ~~Second~~ Third

5 → 2 The ~~active~~ capacitor 101, ~~is series combined with~~ CONNECTED IN SERIES to the primary windings of transformer 102, and, CONNECTED through the secondary windings of transformer 102 to transfer output to the full wave current rectifier device 103. ~~such as that~~ Figure 3 is a circuit schematic diagram of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit, illustrating that ~~the active~~ capacitor ~~is~~ series ~~combined with~~ connected to the primary winding of the transformer ~~whereby~~ so that through the secondary winding of the transformer, ~~to provide~~ the circuit provides output to the full wave current rectifier device.

(A) 4 (B) ~~Third~~ Fourth

3 The ~~active~~ capacitor 101, ~~is series combined~~ CONNECTED IN SERIES between the secondary winding of the transformer 102 and the current rectifier device 103. ~~such as that Figure 4 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit, illustrating that the active capacitor is series combined between the secondary winding of the transformer and the current rectifier device.~~

(A) 5 (B) ~~Fourth~~ 5 or 6

4 The ~~active~~ capacitor 101, ~~is series combined~~ CONNECTED IN SERIES with the primary winding of the transformer 102, whereby the secondary winding of the transformer 102 with intermediate ~~extractions~~ taps and two diodes constitute a full wave current rectifier circuit. ~~such as that Figure 5 is a circuit schematic diagram of the active capacitor regulating type controllable voltage~~ and ~~Sixth~~

current power supply circuit, illustrating that the ~~active~~ capacitor is series ~~combined with~~ connected to the primary winding of the transformer, whereby the secondary winding of the transformer with intermediate ~~extractions~~ taps and two diodes constitute a full wave ~~current rectifier circuit~~.

(A) 6 (B) ~~sixth~~ sixth

5) Three ~~active~~ capacitors 101, ~~are~~ each respectively ~~series combined~~ CONNECTED IN SERIES between the three phase AC power source and the three phase full wave current rectifier device 103_{X_a}. ~~such as that~~ Figure 6 ~~is a circuit schematic~~ diagram of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit, ~~illustrating that three active capacitors are~~ each respectively series ~~combined~~ connected between the three phase AC ~~power~~ source and the three phase full wave current ~~rectifier device~~.

(A) 7 (B) ~~seventh~~ seventh

6) The AC power source that transfers output to the three phase transformer 102, whereby three ~~active~~ capacitors 101 are each respectively ~~series combined~~ CONNECTED IN SERIES between the secondary winding of the three phase transformer 102 and the three phase full wave current rectifier device 103_{X_b}. ~~such as that~~ Figure 7 ~~is a circuit schematic~~ diagram of the ~~active~~ capacitor regulating type ~~controllable voltage and current power supply circuit~~, illustrating that three ~~active~~ capacitors are each respectively series ~~combined~~ connected between the secondary winding of the three phase transformer and the three phase full wave current rectifier device.

(A) 8 (B) ~~eighth~~ eighth

7) The ~~active~~ capacitor 101_1 ~~is series installed~~ CONNECTED IN SERIES between the single phase power source 100 and the load 109,

while the AC terminals of the full current bridge type current rectifier 103 are parallel ~~combined~~ connected to ~~with~~ the two AC output terminals, ~~while~~ the positive and negative terminals of the current rectifier device 103 are parallel ~~combined~~ connected in current direction with the controllable current distributing device 105 ~~as well as that~~ and the output terminals can be selectively series ~~installed with~~ connected to a load current detector device 111 or parallel ~~installed with~~ connected to a load ~~terminal~~ voltage detector device 110 for detecting the relative current or voltage, thereby ~~to control~~ controlling the output voltage control device 106 and ~~further to modulate~~ modulating the AC output voltage or current, ~~such as that~~ figure 8 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit~~ illustrates ~~ing that~~ the ~~active~~ capacitor is series ~~installed~~ connected between the single phase power source and the load, while the AC terminals of the full current bridge type current rectifier are parallel ~~combined with~~ connected to the two AC output terminals.

Through matching with circuit components as well as function omissions and additions, the rear section output circuit of the ~~embodying example~~ embodiment illustrated in figure 1 ~~has the following variations for application selections, as described below:~~ may be varied as follows depending on the application:

~~8)~~ The full wave rectified ~~full wave pulsating~~ DC output terminals ~~are~~ directly parallel ~~combined with~~ connected to a controllable current distributing device 105, which is comprised of linear or switching type solid state or electromechanical components or thyristors, for accepting

control by the voltage output control device 106. In addition, the aforesaid circuit can be series ~~installed with~~ connected to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~ and a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals as required, ~~such as that~~ figure 9 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit~~ illustrates ~~that the front section~~ of the front section of the circuit DC output terminals, ~~are~~ directly parallel ~~combined with~~ connected to a controllable current distributing device.

(A) 10
(B) +eNth

~~If~~ The full wave rectified DC output terminals, which are first parallel ~~combined with~~ connected to the first ~~wave~~ filter capacitor 104, and then parallel ~~combined with~~ connected to a controllable current distributing device 105, which is comprised of linear or switching type solid state or electro-mechanical components or thyristors for accepting control by the voltage output control device 106. In addition, the aforesaid circuit can be series ~~installed~~ connected with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~ a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals as required, ~~such as that~~ figure 10 ~~is a circuit schematic diagram of the active capacitor regulating type controllable~~ voltage and current power supply ~~circuit~~ illustrates ~~ing~~ that the DC output terminals are first parallel ~~combined with~~ connected to ~~wave~~ filter capacitor and then parallel

connected to
~~combined with~~ a controllable current distributing device.

(A) 11 (B) eleventh

~~10~~ The controllable current distributing device 105 which includes
~~comprising of~~ linear or switching type solid state controllable current distributing components or electromechanical components ~~are~~ controlled by a voltage output control device 106 with fixed bias, ~~wherein~~ the fixed bias is obtained ~~including~~ from the series ~~combined~~ connected zener diode ZD101 (including the further series installed current limiting resistor R110). In addition, the aforesaid circuit can be series ~~installed with~~ connected to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals as required, ~~such as that~~ figure 11 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit~~, illustrating es ~~that~~ a controllable current distributing device comprising of linear or switching type solid state controllable current distributing components or electromechanical components ~~are~~ is controlled by a voltage output control device with fixed bias.

(A) 12 (B) twelfth

~~11~~ The controllable current distributing device 105 comprised of thyristor SCR110 ~~is~~ controlled by a variable resistor VR110, wherein the controllable voltage bias is obtained by the variable resistor VR110 and the series ~~combined~~ connected zener diode ZD110 with its

output terminals. In addition, the aforesaid circuit can be series ~~installed with~~ connected to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device ~~as well as that~~ and a second ~~wave~~ filter capacitor 108 can be selectively parallel installed between the output terminals as required. ~~such as that~~ Figure 12 ~~is~~ a ~~circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit,~~ illustrating ~~ing~~ that the controllable current distributing device ~~comprising of~~ that includes thyristors is controlled by a voltage output control device with controllable voltage output.

(A) 13 (B) thirteenth

12) The voltage output control device 106 ~~is constituted by series combining~~ which includes connected in series a zener diode ZD110 between the ~~extraction~~ intermediate terminal of the voltage distributing resistors R111 and R112, which is parallel ~~combined~~ connected between the two power source terminals and the control terminal of the controllable current distributing device 105, thereby ~~to provide~~ providing a proportional voltage bias for controlling the controllable current distributing device 105, which is comprised of linear or switching type solid state or electromechanical components or thyristor SCR110. ~~wherein~~ The aforesaid voltage distributing resistor includes ~~the constitution by~~ other voltage setting permissible circuits. ~~in addition,~~ For example, the aforesaid circuit can be series ~~installed with~~ connected to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~ and a second

~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals, as required. ~~such as~~ Figure 13 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit,~~ illustrating ~~that~~ the proportional bias voltage circuit ~~constituted by~~ includes the voltage distributing resistors and the zener diode, which is series ~~combined~~ connected between the power source and control terminal of the controllable current distributing device.

(A) 14
(B) Fourteenth

~~13~~ The voltage output control device 106 ~~is constituted by series combining~~ which includes a zener diode ZD110 connected in series between the output terminal of the variable resistor VR110 which is parallel ~~combined~~ connected between the two power source terminals and the input terminal of the controllable current distributing device 105, thereby ~~to provide~~ providing a fixed voltage bias for controlling the controllable current distributing device 105, which is comprised of linear or switching type solid state or electromechanical components or thyristors. ~~In addition,~~ the aforesaid circuit can be series ~~installed~~ connected ~~with~~ to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~ and a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals, as required. ~~such as that~~ Figure 14 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit,~~ illustrating ~~that~~ the controllable current distributing device is controlled by a voltage

output control device with adjustable and setting permissive bias.

(A) 15 (B) fifteenth

14) The controllable current distributing device 105 ~~comprised of~~ which includes linear or switching type solid state or electromechanical components or thyristors, The device 105 is controlled by the output voltage control device 106, which is further controlled by the pulse-width modulation functioning voltage output control device CL110 for pulse-width modulation (PWM) control. ~~In addition,~~ the aforesaid circuit can be series ~~installed~~ connected with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~ and a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals, as required, ~~such as that~~ figure 15 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit,~~ illustrating es that the controllable current distributing device is controlled by the pulse-width modulation functioning voltage output control device for pulse-width modulation voltage output control.

(A) 16 (B) Sixteenth

15) The controllable current distributing device 105, ~~comprised of~~ which includes thyristors, The device 105 can be controlled by a phase angle triggering modulation output voltage control device 106 constituted by the variable resistor VR111, phase shifting capacitor C110, and triggering diode D110, ~~in addition,~~ and the aforesaid circuit can be series ~~installed~~ connected ~~with~~ to a diode 107 in the current direction between the controllable current distributing device

105 and the output voltage control device, ~~as well as that~~ a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals, as required. ~~such as that~~ Figure 16 ~~is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit,~~ illustrating ~~that~~ the controllable current distributing device comprised of thyristors can be controlled by a phase angle triggering modulation output voltage control device.

(A) 17 (B) seventeenth

16 The DC power source, which is parallel ~~combined with~~ connected to the controllable current distributing device 105, is series ~~combined with~~ connected to a isolating diode 107 in current direction thereby ~~to connect~~ connecting the output voltage control device 106 and the load. ~~such as that~~ Figure 17 is a circuit schematic diagram of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit, wherein its output terminals are series ~~combined with~~ connected to a isolating diode in the current direction.

(A) 18 (B) eighteenth

17 The DC power source, which is parallel ~~combined with~~ connected to the controllable current distributing device 105, is series ~~combined with~~ connected to a isolating diode 107 in current direction thereby to parallel ~~combined with~~ connected to the output voltage control device 106 and further parallel ~~combined with~~ connected to the second ~~wave~~ filter capacitor 108 ~~to~~ connected to the load. ~~such as that Figure 18 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit, illustrating that the output terminals are~~

~~parallel combined with a wave filter capacitor.~~ connected to

~~18) The application~~ In actuality, the output circuit of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit ~~is combined by~~ is a combination of the aforesaid respective functional circuits described in ~~1)~~ embodiments 2-8 and 10-18. ~~7), 9)-17)~~

~~19) The active capacitor regulating type controllable voltage and current power supply circuit combined by the functional circuits described in 1)-7), 9)-18),~~ stet is ~~whereof~~ and for example, its output terminals are for driving the resistive type or mixed resistive and inductive ~~mixing~~ type or rechargeable battery type DC loads.

(A) 19 (B) nineteenth

~~20)~~ The ~~active~~ capacitor 101 ~~is~~ directly series ~~combined~~ connected between the single phase AC power source 100 and the load 109, ~~while~~ the two AC power output terminals leading to the load 109 are parallel ~~combined with~~ connected to a full wave current rectifier device 103, ~~whereby~~ and the positive and negative output terminals of the full wave current rectifier device 103 ~~is~~ are further parallel ~~combined with~~ connected to a controllable current distributing device 105, ~~comprised of~~ which includes solid state linear or switching solid state controllable current distributing components connected in the polar direction, ~~as well as that~~ the output terminals can be selectively series ~~installed with~~ connected to a load current detector device 111 or parallel ~~installed with~~ connected to a load terminal voltage detector device 110, for detecting the relative current or voltage, thereby ~~to control~~ controlling the output voltage control device 106 and ~~further to modulate~~ modulating the AC output voltage or current, ~~wherein~~ figure 19 ~~is a circuit schematic diagram of the active capacitor regulating type~~

~~controllable voltage and current power supply circuit~~, illustrating ~~that the active~~ capacitor ~~is~~ series ~~combined~~ connected between the single phase AC current power source and the load, while the two AC power output terminals leading to the load are parallel ~~combined with~~ connected to a full wave current rectifier device and a controllable current ~~distributing~~ distributing device.

TP The rear section output circuit of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit can be further ~~relying on~~ defined by rearranging the multi-level series combination type controllable current distributing device to constitute a multiple voltage output circuit, ~~therein~~ the multi-level series combination type controllable current distributing circuit ~~is characterized in that~~ includes two or more than two linear or switching type solid state or electromechanical components or thyristors ~~are series combined first~~ which are first combined in series and are then parallel ~~combined with~~ connected to the output terminals of the front section power source, ~~while~~ each controllable current distributing circuit is individually ~~combined with~~ connected to its matching output control device for its individual control, ~~in addition,~~ the two terminals of the power source and the series connecting point of each controllable current distributing component commonly constitute the multiple voltage ~~extractions~~ terminals, thereby ~~to~~ individually ~~provide~~ providing output to drive the ~~individual~~ load.

TP ~~Figure 20 is~~ the first example of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit illustrating the multiple voltage ~~taps~~ extractions terminal output circuit, ~~thereof~~ in the embodying

(A) 20
(B) twentieth

example of figure 20, a front section current rectifying circuit ~~with~~ having a full wave rectified current function is installed, while the two controllable current distributing circuits 105, comprised of two linear or switching type solid state or electromechanical components, are first series ~~combined~~ connected in polarity direction, then are parallel ~~combined~~ connected with the power source, ~~therein~~ each circuit is respectively coupled with each individual output control device 106, ~~thereby~~ the multiple voltage ~~extractions~~ terminals ~~are~~ ~~constituted by~~ the series ~~combining~~ connected point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual load, ~~in addition,~~ each of the two aforesaid circuits can be series ~~installed~~ connected ~~with~~ to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~, any a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals, as required.

(A) 21 (B) twenty-first

~~Figure 21 is~~ the second example of the a~~ctive~~ capacitor regulating type controllable voltage and current power supply circuit, illustrating the multiple voltage ~~extractions~~ terminal output circuit, ~~thereof~~ in the embodying example of figure 21, a front section current rectifying circuit with a full wave rectified current function is installed, while the two controllable current distributing circuits 105 ~~comprised of~~ including two thyristors SCR110 are first series ~~combined~~ connected in polar direction and then are parallel ~~combined with~~ connected to the power source, ~~and~~ each circuit is respectively coupled with each individual output control

device 116, ~~thereby~~ the multiple voltage ~~extractions are constituted by~~ terminals, ~~taps~~, include the series ~~combining~~ connection point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual loads, ~~in addition~~, each of the two aforesaid circuits can be series ~~installed with~~ connected to a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device, ~~as well as that~~, and a second ~~wave~~ filter capacitor 108 can be selectively parallel ~~installed~~ connected between the output terminals as required.

(A) 22
(B) twenty-second

~~Figure 22 is~~ the third example of the ~~active~~ capacitor regulating type controllable voltage and current power supply circuit, illustrating the multiple voltage extractions output circuit, ~~thereof~~ in the embodying example of figure 22, the ~~active~~ capacitor 101 is series ~~combined~~ connected ~~with~~ to the AC power source 100, whereby the AC terminals of the two full wave bridge type current rectifying device 103 are mutually series ~~combined~~ connected and then are parallel ~~combined~~ connected ~~with~~ to the output terminals of the AC power source 100, ~~while~~ each of the two linear or switching type solid state or electromechanical components ~~is~~ includes connected to the positive and negative terminals of the individual bridge type current rectifier device 103 in a polar direction, ~~thereby to constitute~~ the controllable current distributing device 105, ~~therein~~ the output terminals can be selectively series ~~installed with~~ connected to a load current detector device 111 or parallel ~~installed with~~ connected to a load terminal voltage detector device 110 for detecting the relative current or voltage thereby ~~to~~ further controlling

the output voltage control device 106, ~~and~~ the series combining points of the aforesaid two full wave current rectifier device 103 and the two AC power source terminals constitute multiple AC output voltage or current ~~extractions~~ terminals.

The aforesaid ~~embodying examples of the~~ embodiment of a ~~active~~ capacitor-coupled ~~regulating type~~ controllable voltage and current power supply circuit with multiple voltage ~~extractions~~ terminals ~~distributing output circuit is~~ are based on the example of two stage output voltage ~~hereto~~, in practical applications, two or more than two stages circuits based on the embodying examples described in figures 1~22 can be designed according to ~~wherein~~ the following four ~~constituting~~ principles of the multiple voltage ~~extraction~~ distributing circuit; ~~includes the following:~~

(1) The voltage stages of the multiple voltage ~~extractions distributing~~ output circuit can be of two stages or more than two stages;

(2) Same numbers of the controllable current distributing devices 105 can be installed according to voltage stages of the multiple voltage ~~extraction distributing~~ output circuit, wherein their series ~~combining~~ connection points can be used for multiple voltage ~~extraction~~ output; The

(3) Same number of voltage control devices 106 can be installed according to voltage stages of the multiple voltage ~~extraction distributing~~ output circuit to individually control the current distributing device 105; and

(4) A common output voltage control device can be installed to individually control the controllable current distributing devices 105.

Besides, application circuits of the active capacitor regulating type controllable voltage and current power supply circuit with single voltage output or multiple voltage extractions output, includes the following system constitutions. First,

1) The controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc., thereby a primary voltage stabilizing circuit between the output voltages can be omitted allowing the circuit to react with the output voltage variations.

2) The controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc., thereby a primary voltage stabilizing circuit can be installed between the output voltages to improve the control on the controllable current distributing device affected by the voltage variations.

Figure 23 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit, illustrating that a voltage stabilized circuit is installed before the output terminals, wherein the primary voltage stabilizing circuit is mainly comprised of the output voltage control device 106, voltage distributing resistor R201, and the zener diode ZD201 which is parallel combined between the two

terminals of the output voltage control device. ~~In addition~~, the aforesaid circuit can be series ~~installed~~ connected ~~with~~ a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device ~~as well as that~~, and a second ~~wave~~ filter capacitor 108 can be selectively parallel installed between the output terminals as required.

The third system consideration is that

3) If the controllable current device 105 is controlled by the pulse-width output voltage control device CL110 for pulse-width modulation (PWM), and the primary voltage stabilizing circuit between the output voltages can be selected to be installed or not installed.

The fourth system consideration is that

4) The load-side feedback signal is accepted by the output voltage control device 106 to control the current distributing device 105 for providing corresponding distributing current, thereby ~~to control~~ controlling the terminal voltage or output current.

As summarized from the above descriptions, the invention is ~~by~~ the series ~~combining~~ combination of ~~the~~ capacitors and bridge type current rectifier devices to constitute a voltage reducing and current limiting rectifying circuit, ~~while a~~ together with controllable current distributing circuit device ~~is~~ parallel combined between the output terminals of the current rectifying circuit ~~thereby~~ to actively control the output voltage, ~~setting status, therefore the invention is so innovative with clear circuit functional effectiveness, your lawful approval is greatly appreciated.~~

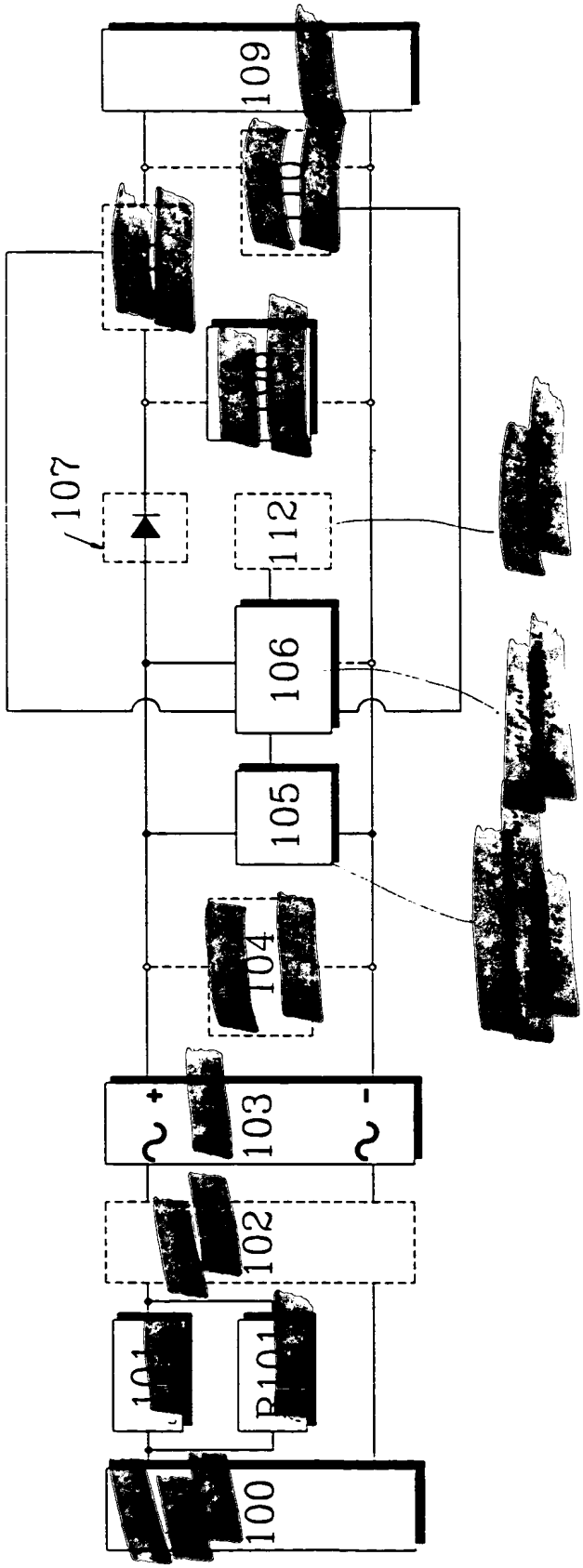

FIG. 1

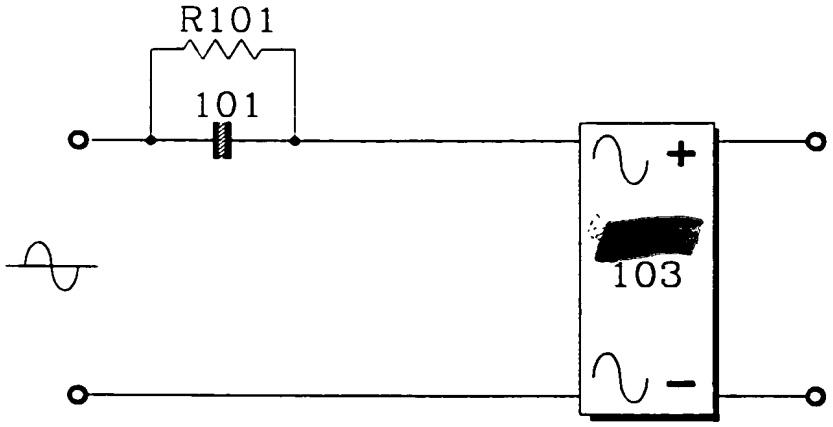

FIG.2

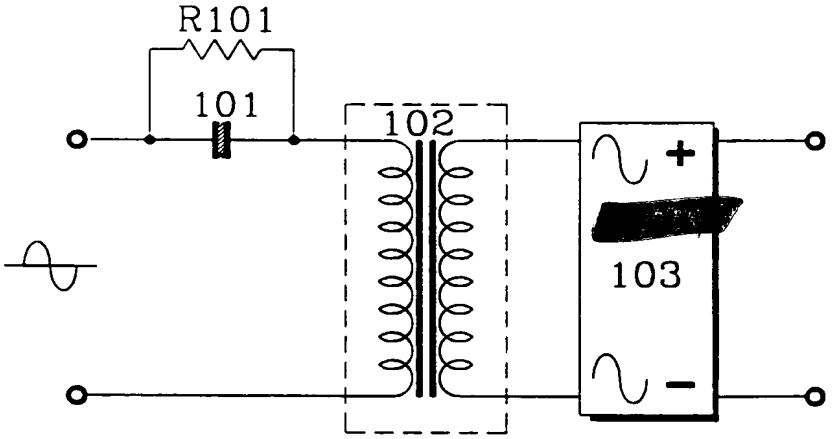

FIG.3

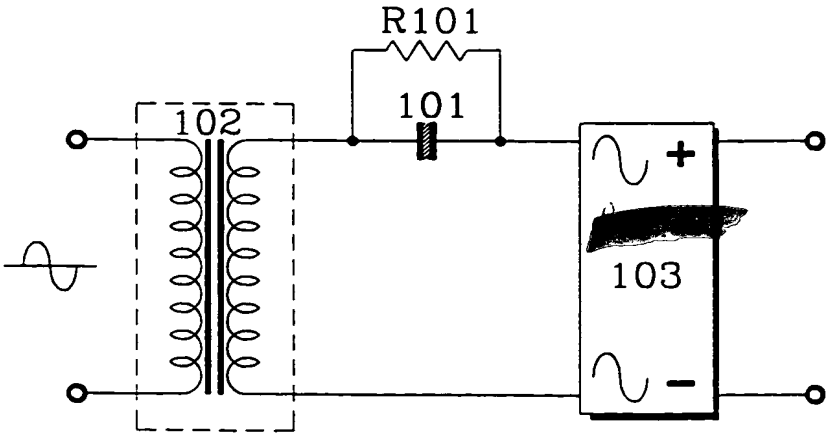

FIG.4

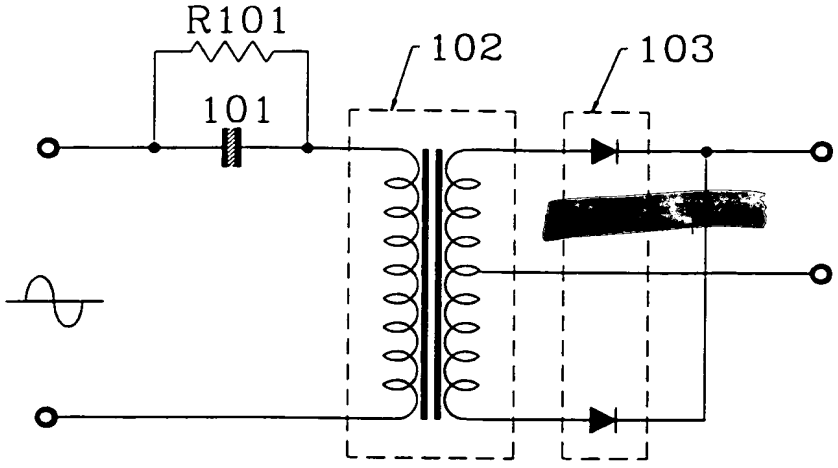

FIG.5

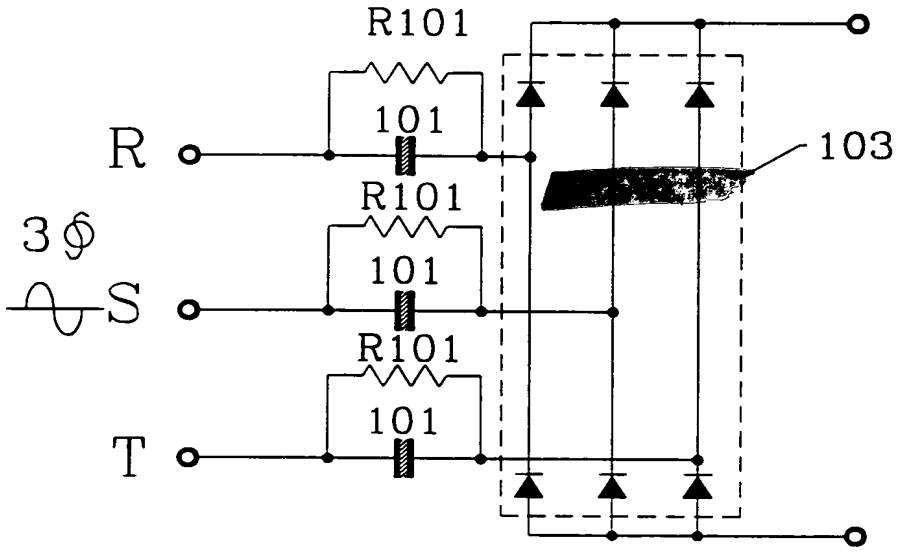

FIG.6

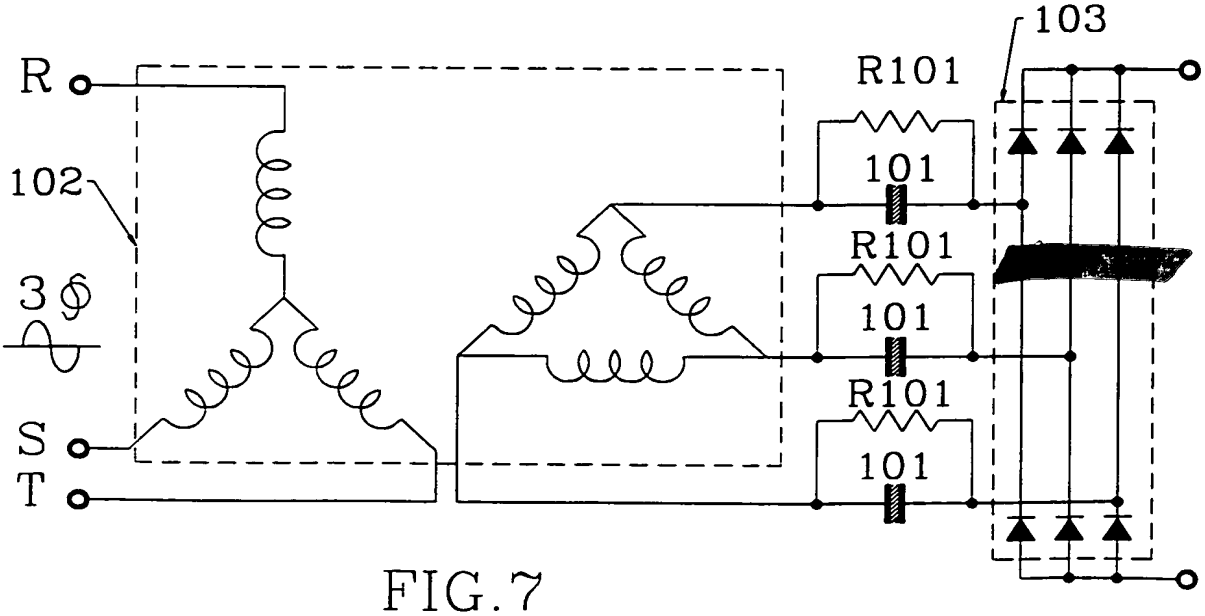

FIG.7

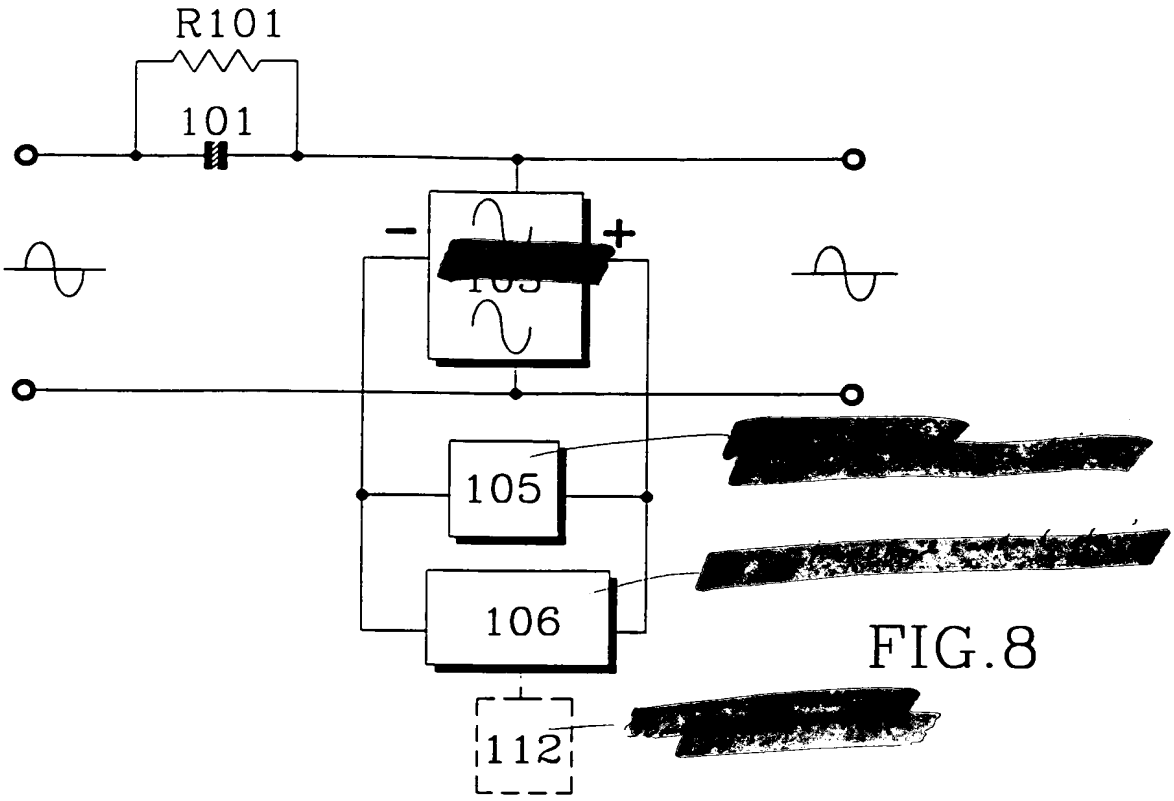

FIG.8

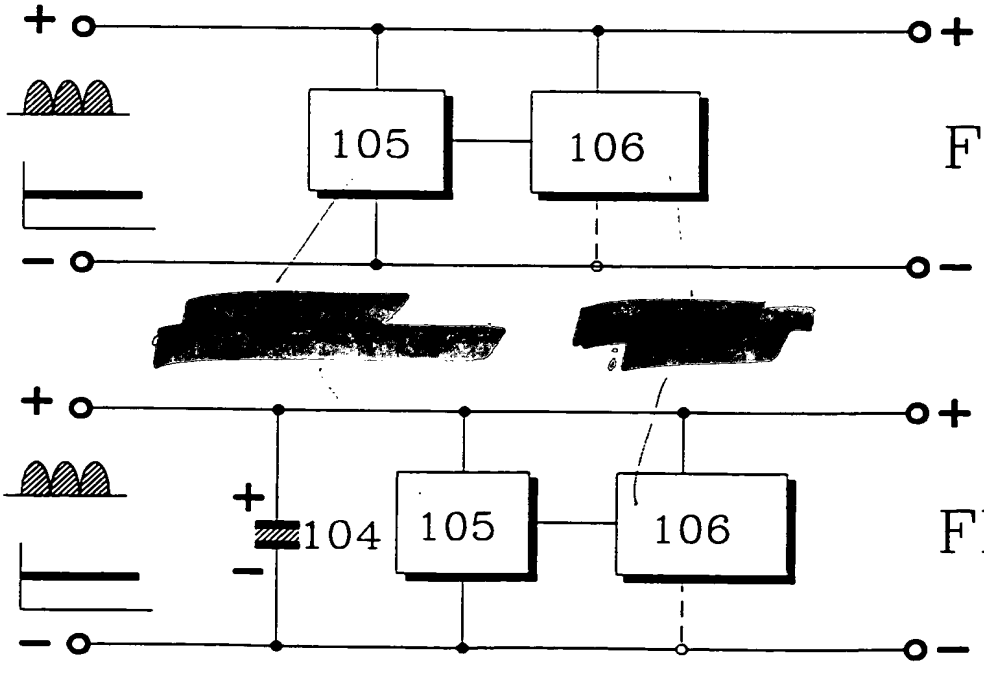

FIG.9

FIG.10

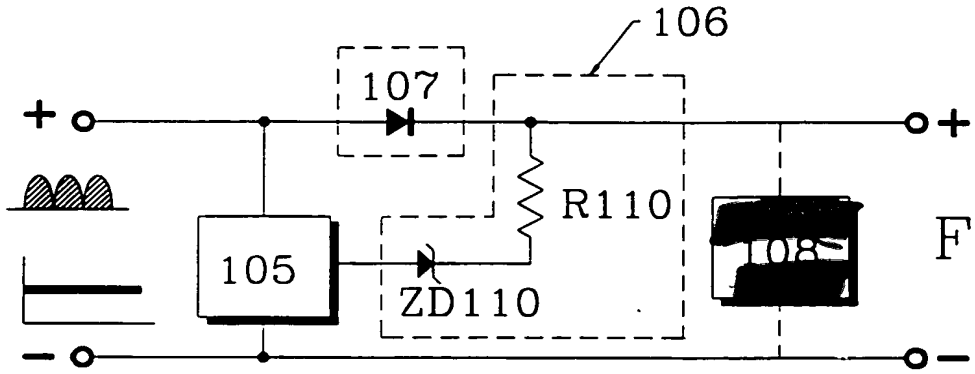

FIG. 11

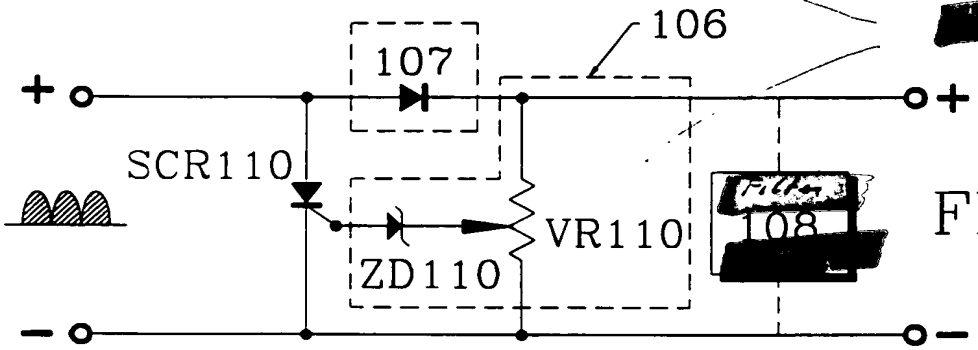

FIG. 12

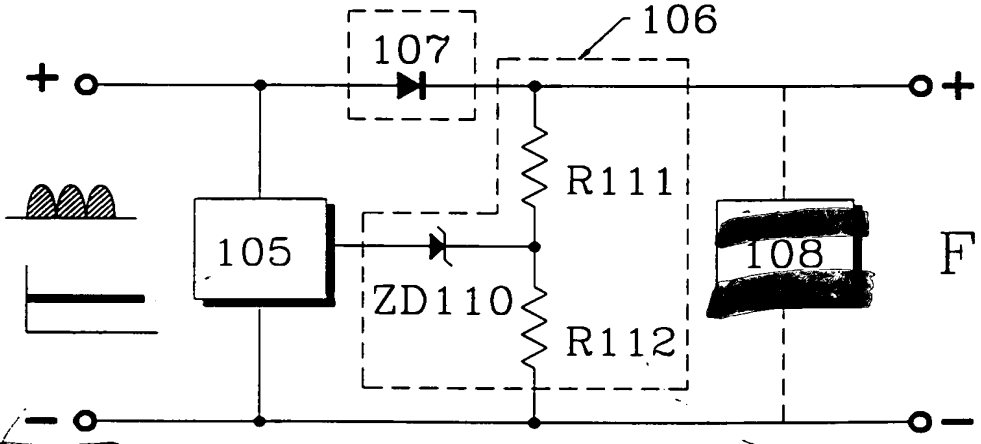

FIG. 13

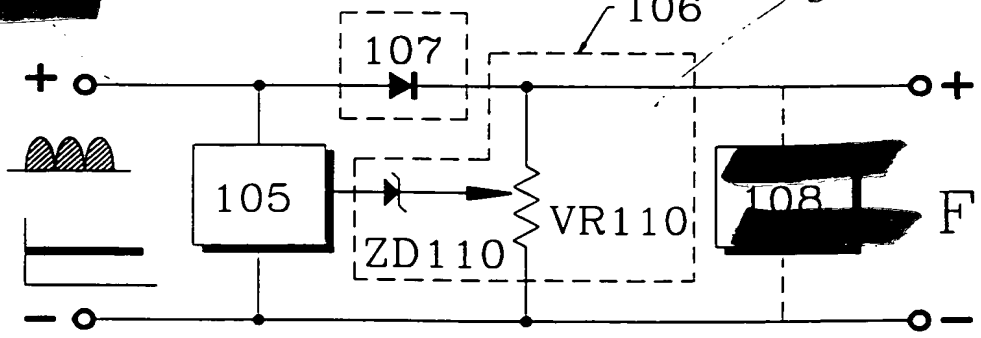

FIG. 14

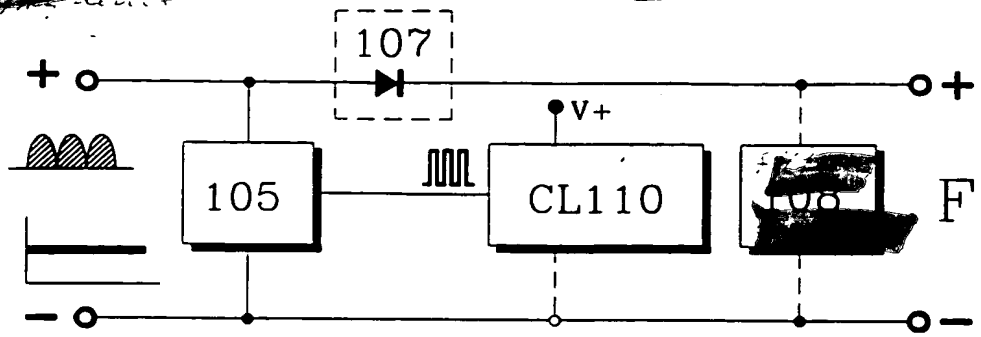

FIG. 15

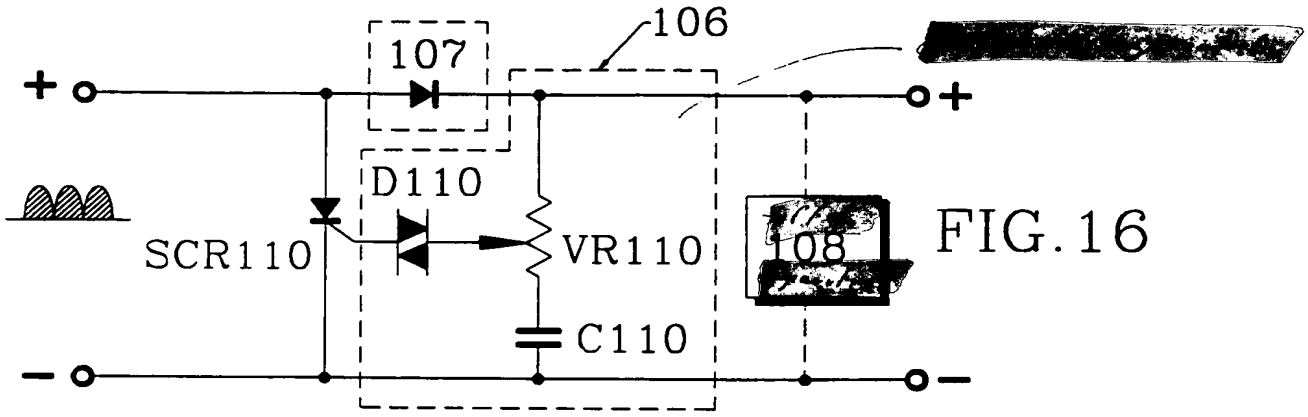

FIG. 16

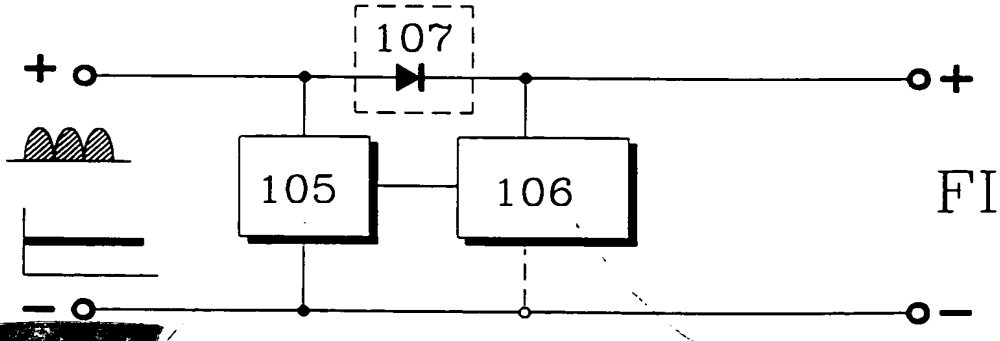

FIG. 17

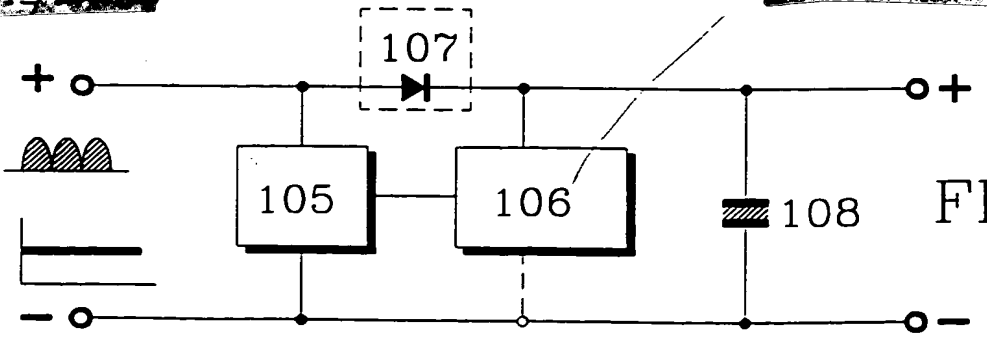

FIG. 18

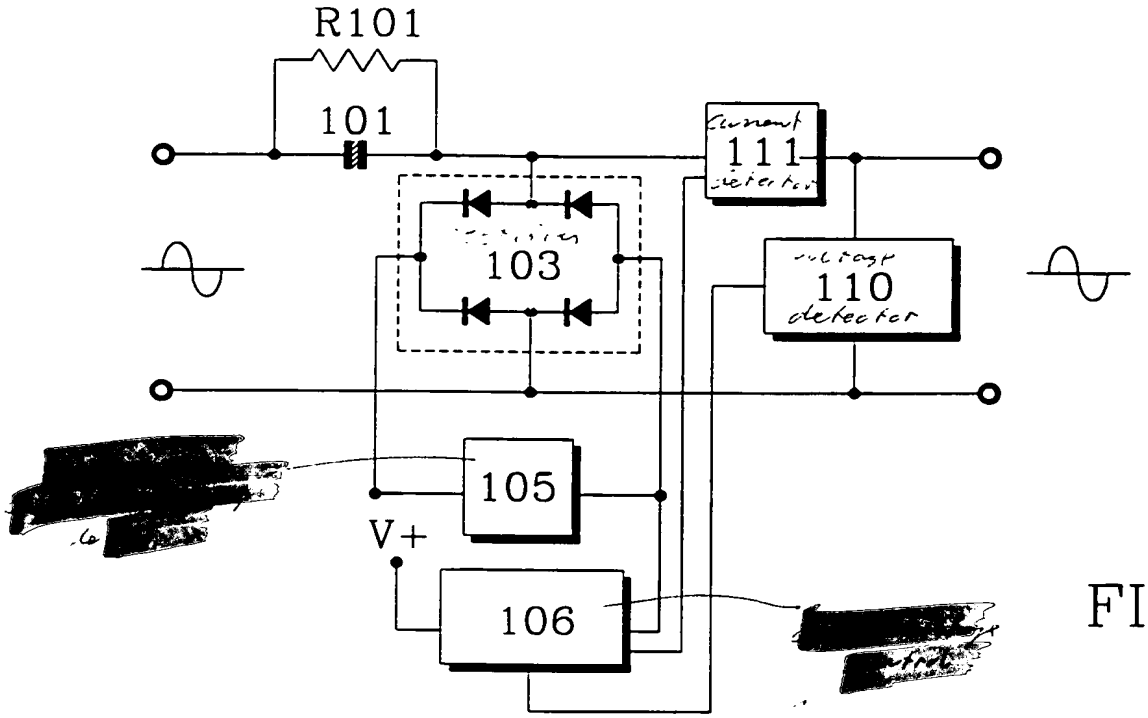

FIG.19

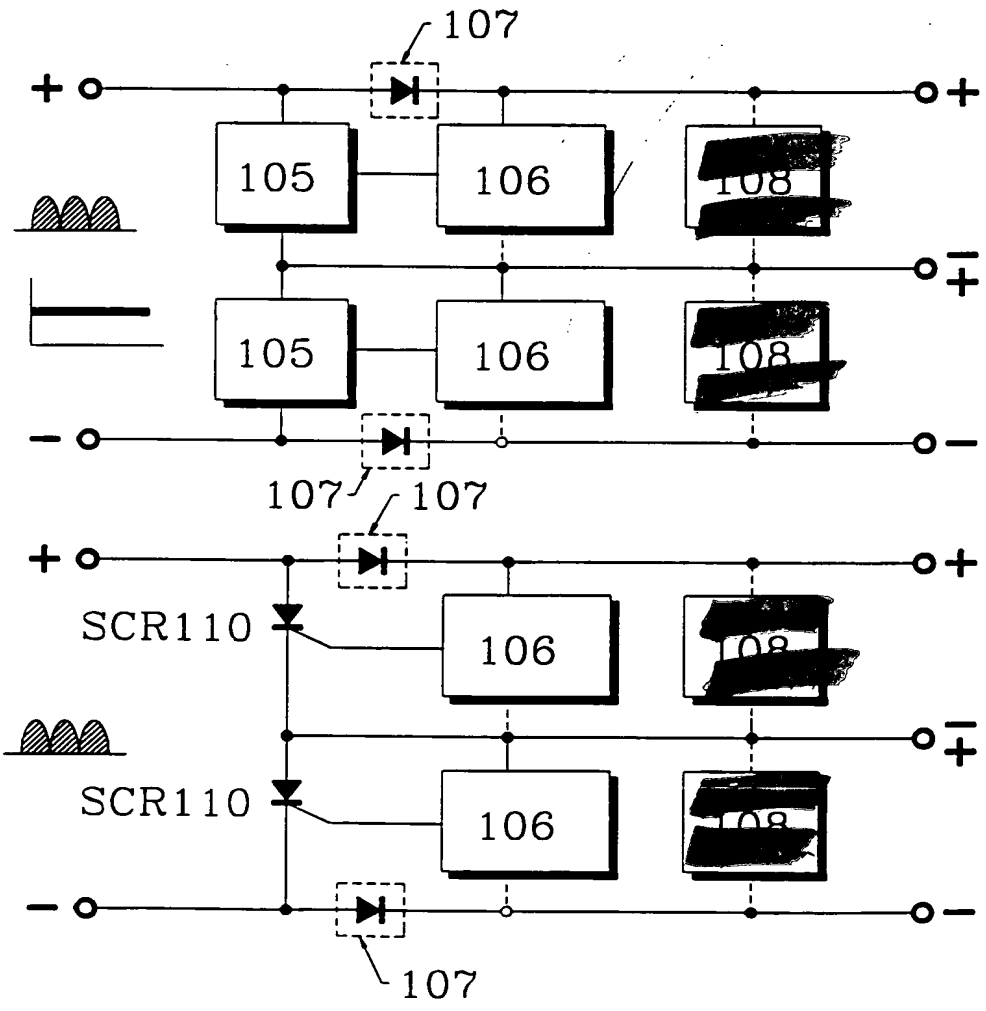

FIG.20

FIG.21

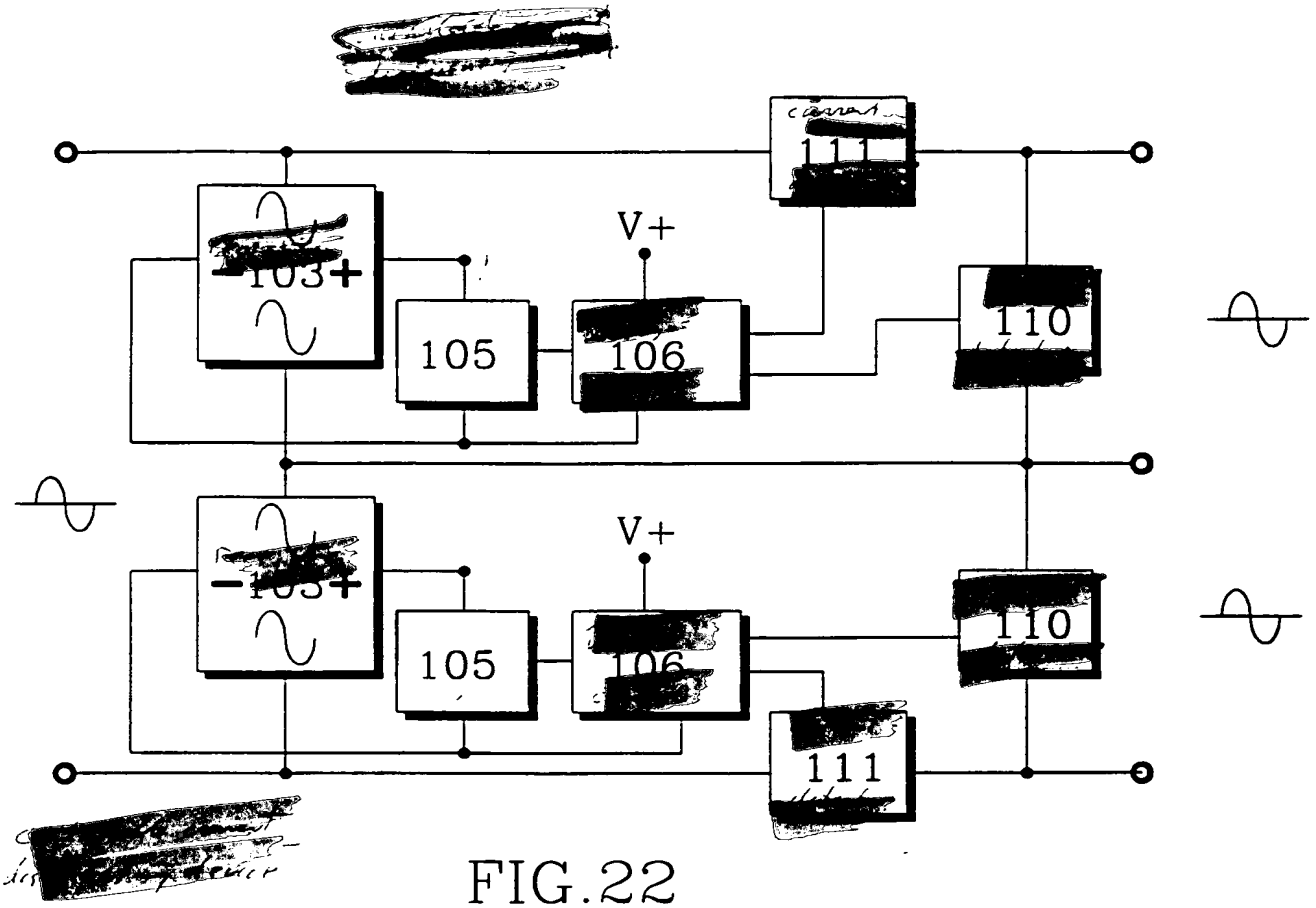

FIG.22

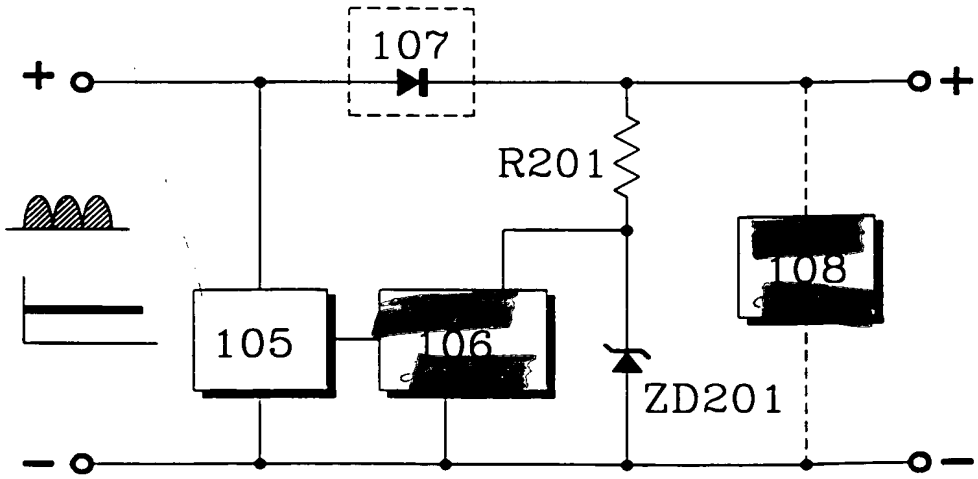

FIG.23